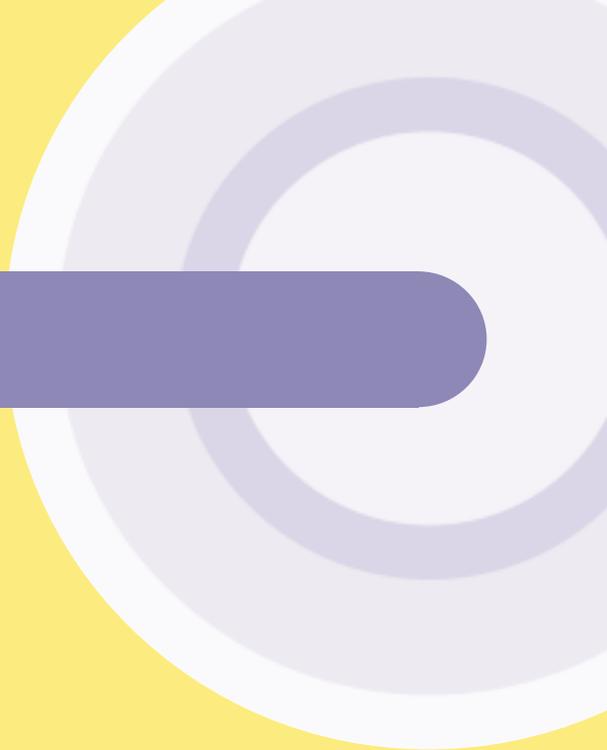


Radio Aids

An introductory guide



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First published in April 2001. Revised edition February 2005.

We would like to thank the following companies for their help in providing information for this publication:

- BioAcoustics Ltd
- Phonak UK Ltd
- Connevans Ltd
- Oticon Ltd
- PC Werth Ltd

Cover photos by: Left - T. Fireman Middle - Craig Young Right - T. Fireman

ISBN: 0 904691 56X

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All of the information in this book applies to England, Wales, Scotland and Northern Ireland.

- Throughout this book, we use the term '**radio aid**' to include equipment sometimes referred to as **FM systems** or **personal FM systems**.
- We use the term 'deaf' to mean all types of deafness, including temporary deafness such as glue ear.
- Technology changes quickly. We did our best to make sure the information in this guide was correct when it was printed. We cannot be held responsible for any mistake or missing information, or for any action you take or fail to take as a result of the information in this guide.

This information is available in large print, in Braille and on audio tape.

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Contents

| | | |
|----|---|-----|
| 1 | Introduction | p4 |
| 2 | What is a radio aid? | p5 |
| 3 | Who can a radio aid help? | p6 |
| 4 | How to get a radio aid | p7 |
| 5 | The parts of a radio aid | p9 |
| 6 | Different ways of connecting a radio aid | p13 |
| 7 | Radio aids – special features | p18 |
| 8 | Working with radio aids at home and at school | p21 |
| 9 | Taking care of radio aids | p24 |
| 10 | Classroom soundfield systems and acoustics | p30 |
| 11 | Appendix 1: Technical specification and suppliers | p32 |
| 12 | Appendix 2: Frequency comparison table (for school use) | p43 |
| 13 | Appendix 3: Technical terms | p45 |

Introduction

This book is designed for parents It aims to explain

- how radio aids can help deaf children;
- the different types of radio aid available; and
- how to maintain radio aids.

Teachers and other staff working with deaf children and young people may also find the information in this guide useful.

You may not need all of this information straight away. We hope you keep this booklet and use it as and when you need to. The booklet is split up into different sections. Each section has a different colour tab to help you find the information you need. See the **Contents** page to find out which colour tab to look for.

Other NDCS publications that you may find useful

- *Hearing Aids - A guide*
- *Understanding Deafness*
- *Cochlear Implants - A guide for families*
- *Digital hearing aids*
- *Technology at home*

For more information on our publications, or on radio aids, please phone our Freephone helpline on 0808 800 8880 (voice and text) or email helpline@ndcs.org.uk. Many publications are also available to download and order from our website www.ndcs.org.uk.

What is a radio aid?

There are many situations in which your deaf child may find it difficult to listen

The three main situations are where:

- there is unwanted background noise;
- sounds are echoing around the room (reverberation); and
- there is a distance between the person who is speaking and the deaf child.

A radio aid should help to overcome these problems. For example, if your child is using a radio aid that is working properly, a teacher standing at the far end of a noisy classroom should sound as if he or she is standing directly in front of your child.

A radio aid consists of a transmitter, worn by a teacher for example, and a receiver, worn by your child. The radio aid works by making the sound the child needs to hear (for example, the teacher's voice) clearer in relation to other unwanted noise.



Who can a radio aid help?

If your child gets some benefit from their hearing aid or cochlear implant, they may find a radio aid useful. This is because a radio aid will work with your child's hearing aid or cochlear implant to make it easier for them to concentrate on the sounds they want to hear.

Radio aids are recommended for children who have

- hearing aids;
- bone anchored hearing aids;
- bone conduction hearing aids; or
- a cochlear implant.

Children with all levels of deafness have benefited from using radio aids. This is because your child's hearing aids are prescribed by an audiologist and set up to amplify sounds in a way that is suitable for their deafness. However, radio aids do not amplify sounds in the same way as hearing aids, but help your child to concentrate on the particular sounds or voices they need to hear. Your child's hearing aids are chosen to suit their deafness and the radio aid is then set up to work properly with the hearing aids. So, the benefits of a radio aid are limited by the suitability of the hearing aids.

A radio aid can sometimes be useful for children who do not use hearing aids. Children with a mild deafness may find that they benefit from using a radio aid. Children who have difficulty concentrating, particularly in noisy settings, may also find that using a radio aid helps them to concentrate on what a teacher is saying. For example, this may include children with an auditory processing disorder (APD) or attention deficit disorder (ADD).

It is very important for you to get the views of a range of professionals working with your child, such as your child's teacher, an educational psychologist or an audiologist. Please see page 17 for more information about options for children who do not have a hearing aid or a cochlear implant.

How to get a radio aid

For children at school

England, Wales and Northern Ireland

Most radio aids are provided to schoolchildren through their local education authority (in England and Wales), and the Education and Library Board (in Northern Ireland). If you feel your child might benefit from a radio aid, ask your child's teacher, the teacher of the deaf, special educational needs co-ordinator (SENCO) or the head of the hearing impaired service for advice.

Some deaf children will have a statement of special educational needs (a document that sets out a child's needs and all the extra help they should receive). The need to provide a radio aid can be set out in the statement, usually in part 3. This means that the LEA has a legal responsibility to provide a radio aid.

Even if a deaf child does not have a statement, the education service and school still have an obligation to meet their needs.

Scotland

In Scotland, radio aids are provided for school children through the education department in each local council authority. To get a radio aid, a child does not need to have a 'record of needs' (or a 'co-ordinated support plan' when these replace records of need in 2005). However, if your child does have a record of needs, make sure that if a radio aid is recommended in part 4 of the record, part 5 of the record states that one will be provided.

If you think your child would benefit from using a radio aid, get advice from the head of the sensory or hearing impaired service, teacher of the deaf, educational audiologist, educational psychologist or our Freephone helpline on 0808 800 8880 (voice and text).

For young people in further education

England, Wales and Northern Ireland

If a young person has a statement of special educational needs and the need for a radio aid has been included in the transition plan, usually up to the age of 19, the local education authority (in England and Wales) or the Education and Library Board (in Northern Ireland) is legally responsible for meeting the cost of a radio aid. If a young person does not have a statement, the deaf student needs to go through the learning support team at their further education college to get their support needs assessed.

Scotland

The education departments of the local council authorities in Scotland are not responsible for young people in further education and so do not provide equipment for young people with special educational needs (SEN) once they have left school. If it is considered to be in the young person's best interests, they may stay on at school until the age of 18 (with discretion up to their 19th birthday). In Scotland, when a young person leaves school they must return any personal equipment, including the radio aid, to the education department. If a young person with

special educational needs has a record of needs or a co-ordinated support plan when they leave school, that record or plan is closed and kept on file for five years. It is then destroyed.

The Scottish Further Education Funding Council (SFEFC) has a budget for students who need extra support in further education. Colleges draw up Personal Learning and Support Plans for each student who will study there. The amount of money needed is worked out from the Personal Learning and Support Plan. Funding is available to buy equipment. If you need more advice on this, phone the NDCS Freephone helpline.

For young people in higher education

England, Wales and Northern Ireland

Deaf students wanting to use a radio aid in higher education can use the specialist equipment part of the Disabled Student Allowance to buy the equipment. Students apply for this funding through their local education service and rates of Disabled Student Allowance depend on the type of course studied.

If a deaf student is not entitled to funding, they may be able to get a radio aid on loan, from their university or college. Many universities and colleges have their own equipment, so it would be worth checking this with the learning support team.

Students can also apply for funding for a radio aid through private trusts if no other source of funding is available. For more information on the Disabled Student Allowance and other sources of funding for students, visit the SKILL website at www.skill.org.uk or phone them on 0800 328 5050 (Freephone), 020 7657 2337, or 0800 068 2422 (textphone).

Scotland

In Scotland, deaf students who want to use a radio aid in higher education can also use the specialist equipment part of the Disabled Student Allowance to buy the equipment. However, this funding is provided through the Student Award Agency for Scotland (SAAS) and not individual education departments in local council authorities. For further information, visit the Student Award Agency for Scotland's website at www.student-support-saas.gov.uk, phone them on 0845 111 1711, or fax them on 0131 244 5887.

For young people in work

A radio aid can be useful in the world of work. An employer may be willing to provide a radio aid and other equipment. The Disability Employment Advisor at the local Jobcentre, Jobcentre Plus or social security office will also be able to give you advice on the Access to Work scheme. This can provide funding (alongside an employer's contribution) for both equipment and professional support to help with communication.

Buying privately

You can buy a radio aid yourself. For a full list of suppliers, see appendix 1 on page 42. Most suppliers will sell equipment direct to the general public. You will not have to pay VAT on the radio aid if it is bought by or for a deaf person. (The supplier will send you a form to fill in so VAT is not charged.)

The parts of a radio aid

Transmitter



All radio aids include a transmitter. This takes the sound the child needs to hear, converts it to a radio signal, and sends it to the receiver. Radio aid transmitters use the same technology as ordinary domestic radios. This provides a high-quality signal. Most radio aids are designed to be worn by someone speaking (usually a teacher or parent). However, some are hand-held or can be placed on a table so they can be pointed towards a speaker or passed around a group.

Most transmitters will automatically limit the volume of the radio aid if there is a very loud sound near to the transmitter.

Receiver



The child wears the receiver. The receiver picks up the radio signal from the transmitter and changes it into a sound that the child can hear. Most receivers include a volume control, which will be set by the audiologist or teacher, although older children can adjust it themselves. This control may be lockable. Sometimes the receiver will have a control to help set up the radio aid with the child's hearing aids.

There are two main types of receiver. Body-worn receivers are usually worn on the child's chest or waist, depending on their age (see page 21). Behind-the-ear receivers are small units that attach directly to some hearing aids and cochlear implant processors.

Microphones

There are several different types of microphone, designed for different situations.



Built-in microphones

Some transmitters include a built-in microphone. The transmitter is then usually worn on a strap around the teacher's neck. Other transmitters with built-in microphones are hand-held units designed to be pointed in the direction of the person speaking, or passed around a group. A receiver may include a built-in microphone to pick up sounds near the child. This would usually only be used if the receiver is being used with a neckloop (see page 14).



Tie-clip and lavalier (neck-strap) microphones

It is often more comfortable for teachers to wear a transmitter on a waist belt. A microphone on a lead can then be used to pick up the sound of their voice. It can be clipped to a tie or other clothing (tie-clip microphone), or worn on a cord around the neck (sometimes called a lavalier microphone). It should be within 15 to 20cm from the mouth. Manufacturers may offer a choice of microphones which either pick up sounds equally from all directions (omnidirectional) or give preference to sounds from one direction (directional). Omnidirectional microphones can be used in most situations. The radio aid supplier will be able to give you advice on the most appropriate microphone for you.



Head-worn microphones

Head-worn microphones may be the most effective option, as the microphone stays close to the mouth of the person speaking as they move their head.



Conference microphones

In school, children often spend time working in small groups. To deal with situations like this, some manufacturers have developed conference microphones. These are usually designed to sit in the middle of a table and to pick up sounds from the surrounding area. Conference microphones can be very useful but they have certain drawbacks. They are designed to pick up all nearby sounds so they will also pick up unwanted background noise. The sounds of papers rustling, objects being moved on the table and the table vibrating can be particularly noticeable.



Aerials (antennas)

All receivers and transmitters need an aerial (antenna) to receive and send the signal. Sometimes the aerial is built into the radio aid. For example, the lead of a transmitter's tie-clip microphone may also work as the aerial. Sometimes the aerial is a length of wire that plugs into the transmitter. Do not cut or shorten the aerial as this will affect its performance.

Batteries

All radio aids are powered by batteries. The battery in a hearing aid also powers behind-the-ear receivers. This usually means that when the behind-the-ear receiver is connected, the hearing aid's battery will run down more quickly than normal.



Rechargeable batteries

Some radio aids use batteries that cannot be recharged and are replaced regularly. However, this can be expensive so most radio aids use rechargeable batteries. (You should know that even rechargeable batteries only last for a limited time and should be checked carefully to see when they need replacing). Batteries can usually be recharged either in a separate charger or inside the radio aid.



Battery chargers

Manufacturers of radio aids produce special chargers for their equipment. There are two types. One type of charger simply has a lead that plugs into the radio aid. A more expensive alternative is the 'drop-in' charger, which has 'pockets' which the transmitter and receiver are placed into. Several of these chargers can be connected together. In schools, where many radio aids are used, this can be the easiest way of managing all radio aids and recharging them all overnight.

Some chargers are described as 'intelligent'. This means that they will sense the level of charge remaining in a battery and charge them correctly. They may empty the battery first which will help to make it last longer.

When storing and handling batteries, be careful not to allow the positive and negative terminals to touch, or for any metal object to come into contact with them. If this happens, the batteries can overheat.

Different ways of connecting a radio aid

Radio aids are most likely to be used with your child's own behind-the-ear or in-the-ear hearing aid or their cochlear implant. There are various ways of connecting the radio aid's receiver to your child's hearing aids. Each method has advantages and disadvantages.

Using a radio aid with hearing aids



Direct audio input

Most hearing aids used by children have 'direct audio input'. This allows the electrical signal from a radio aid to be fed directly into the hearing aid, providing a consistent and high-quality sound. You can sometimes tell if your child's hearing aid has direct audio input by looking for a row of gold dots on the hearing aid's casing. Check with the clinic which provided your child's hearing aid to be sure.

In most cases, to use direct audio input on your child's hearing aid, a 'shoe' must be used. This 'shoe' fits snugly onto the bottom of the hearing aid (around the battery compartment).

To connect the radio aid to your child's hearing aid, the correct type of direct audio input lead needs to be plugged into the 'shoe'. If your child uses one hearing aid, the direct audio input lead will be a single, straight lead (monaural). If your child wears two hearing aids, the lead will be in the shape of a 'Y' (binaural) to connect to both hearing aids.

Many digital hearing aids have direct audio input, but they may need to be programmed to work correctly. You should ask your audiologist to make sure the hearing aid is set up correctly to use with a radio aid. If the hearing aid has several different programmes, the audiologist will be able to tell you which one to use.

Choosing the correct connecting leads and 'shoes' for the various types of hearing aids can be confusing. This is because:

- some hearing aids may have more than one type of 'shoe' available; and
- 'shoes' produced by a supplier may fit several different hearing aids from their range, but only work correctly with one type.



If you have any concerns about how to connect a radio aid, or are worried about whether you have the right lead or 'shoe', speak to a qualified technician. You can also contact our technology team for further information by ringing our Freephone helpline.



Neckloops

An alternative to direct audio input is for your child to wear a wire (known as a neckloop) around their neck. This is connected to the radio aid's receiver. The child's in-the-ear or behind-the-ear hearing aid is switched to the telecoil ('T' or 'MT') position so they can hear sounds from the radio aid. (This works in the same way as a loop system that you might use in the home to help your child listen to the television.)

If your child has a digital hearing aid, you may not be able to see a switch labelled 'T' or 'MT', but your audiologist can usually set the hearing aid up so that one of the programmes works as a 'T' or 'MT' position. You should ask your child's audiologist to do this if your child wants to use a radio aid neckloop or a loop system.



When a hearing aid is switched to 'T', the hearing aid's microphone may be switched off. This means that a child using a radio aid with a neckloop would not be able to hear their own voice or nearby sounds. To allow them to hear these important sounds, some radio aid receivers include a built-in microphone to pick up environmental noises, or the option to connect a tie-clip microphone for this purpose.

The quality of the sounds a child can hear using a neckloop with a radio aid may depend on:

- the type of neckloop used (generally neckloops that are thicker are more effective because they create a stronger magnetic field);
- the position of the hearing aid in relation to the neckloop (as your child moves their head, the level of sound they can hear may change);
- how well the 'telecoil' in the hearing aid works (this can be different from one model of hearing aid to another, especially with in-the-ear hearing aids); and
- electromagnetic interference. (These are unwanted magnetic fields that are given out by nearby electrical equipment such as fluorescent lights, televisions, computers and so on. These fields can mean that your child picks up uncomfortable buzzing noises through their hearing aids.)

For the reasons above, this way of connecting a radio aid to a hearing aid is less popular than direct audio input. **We recommend direct audio input, rather than neckloops, in most situations.** However, neckloops are still an option for children who like the fact that the neckloop can be worn under clothing, or for those whose hearing aids do not have direct audio input.

It is important that you and your child's teacher know about the possible dangers of wearing a neckloop. It might get caught on things such as door handles, or be tightened by accident.

Digital neckloops

A small number of radio aids can be used with a special digital neckloop. This offers better sound quality than a standard neckloop and there is less risk of picking up interference. Digital neckloops are used with a small receiver which plugs into the hearing aid, so the hearing aids must have direct audio input. For more information, please contact our technology team by phoning our Freephone helpline.

Using radio aids with a bone conduction or bone anchored hearing aid

When a child uses a bone conduction or bone anchored hearing aid, they are likely to benefit from using a radio aid.



Bone conduction aids

Bone conduction aids use a vibrating device to transmit sound through the skull to the inner ear (cochlear). The vibrating devices of bone conduction aids are normally mounted on a sprung headband, or are sometimes included in the arms of spectacles (see our publication *Hearing Aids - A guide*). Many bone conduction aids have direct audio input and can be connected to a radio aid in the same way as standard behind-the-ear hearing aids. Your child's audiologist should set up the combined hearing aid and radio aid system.



Bone anchored hearing aid

Most bone anchored hearing aids have direct audio input. Manufacturers of bone anchored hearing aids also provide special leads to connect the radio aid's receiver to several different types of radio aids.

It is not possible to test a bone anchored hearing aid in the same way as conventional hearing aids, so when a radio aid is first used, the complete system should normally be sent to the hearing aid supplier to be set up. A special listener has recently been developed to allow a hearing person to check that the bone anchored hearing aid is working properly.

Using radio aids with cochlear implants

The use of radio aids with cochlear implants is widely recommended.

A radio aid's lead is usually plugged directly into a cochlear implant's processor. (Some processors need a special adapter.) It is very important to use the correct lead, and your cochlear implant team will be able to give you advice on this.

However, there are considerable differences when it comes to fitting and managing a radio aid used with a cochlear implant. Cochlear implants and radio aids cannot be checked or tested in the same way as conventional hearing aids.

We recommend that the radio aid is set up by the implant team, who will use specialist equipment not normally available to other professionals. You should also ask the implant team to regularly check the implant's processor and the radio aid.

You and your child's teacher can check the radio aid by following the procedures described on page 28. For some cochlear implants, earphones are available that allow a parent or teacher to listen to the sound received from the radio aid.

However, this only allows you to hear the sound from the radio aid before it is processed, so you cannot check that the complete system is working properly.

If your child cannot identify and report any problem they may be having with the cochlear implant and radio aid, the problem may continue. Problems will only be identified by you or a teacher who notices any change in the way your child behaves or responds.

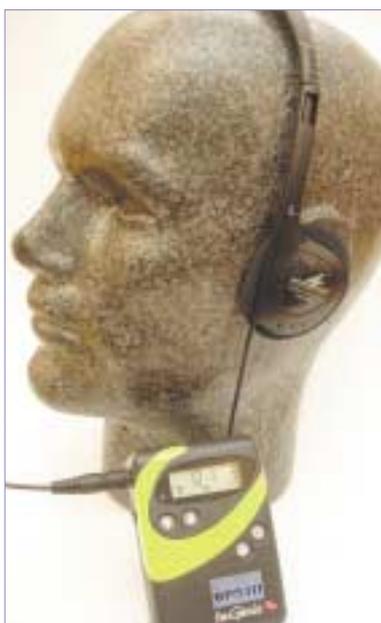


For information about using a radio aid with your child's cochlear implant, contact your implant team. You can also contact our technology team by phoning our Freephone helpline.

Using a radio aid without hearing aids

Radio aids are usually used together with hearing aids or cochlear implants. Sometimes a radio aid can help a child who does not wear a hearing aid, but has difficulty concentrating or picking out different sounds in the classroom. A radio aid may also benefit a child with a temporary deafness or a child who cannot wear a conventional hearing aid. Children who have a unilateral deafness (that is, deafness in one ear) are sometimes not provided with hearing aids. But in the noisy conditions of a school classroom, a radio aid may help them.

There are three main options.



Headphones

Headphones can be connected to some body-worn radio aid receivers. Before your child uses a radio aid in this way, **the child's audiologist or the head of the hearing impaired service should make sure the sound levels are right for your child.** It may be a good idea to lock or limit the volume control so that young children cannot alter the sound level once it has been set.

A wide range of headphones is available. The manufacturer of your radio aid will supply their own headphones, or recommend suitable alternatives. The headphones should be lightweight so that they are comfortable to wear for a reasonable period of time. When a radio aid is used with headphones, it will only be possible to check that it is working correctly by carrying out simple listening tests. If you (or your child's teacher) have any concerns, speak to the provider of the radio aid.



Portable soundfield systems

A portable soundfield system is a radio aid receiver with an amplifier and a loudspeaker attached. This is all contained in a portable case, which your child can take from class to class and place on their desk.

The teacher wears a transmitter and a microphone in the same way as with a standard radio aid. The sound of the teacher's voice is sent to the receiver and your child hears it through the loudspeaker. There is a volume control your child can adjust until the level of sound is comfortable.

Portable soundfield systems are easy to use. However, they are not suitable if your child is involved in practical or physical activities or is not sitting at a desk for most of the time.



Personal radio receivers

The Phonak EduLink is a recent alternative to a portable soundfield system. This is a behind-the-ear receiver with an earphone.

Radio aids – special features

Frequency options



A radio aid's receiver and transmitter must be on the same frequency. Most radio aids allow you to change that frequency (like tuning into a different radio station). This is important when children in different classes at the same school all want to use radio aids. The children must have their radio aids on different frequencies to avoid hearing the wrong information or getting interference.

With most radio aids you can choose from a number of different frequencies using controls on the receiver and transmitter. With some older radio aids, the frequency is changed by replacing a small, plug-in part (sometimes called a crystal). A colour or a letter often identifies these.

Radio aids have sometimes been known to receive unwanted signals (for example, from a local taxi company). This is a rare problem. However, if you do receive unwanted interference, contact your local hearing impaired service. If the problem continues, the hearing impaired service should get advice from the manufacturer of the radio aid. The Government regulator, Ofcom, may be able to look into the source of the problem.

If your child's radio aid receives unwanted interference, changing to another frequency may solve the problem.

Because all radio aids use the same group of frequencies, one manufacturer's transmitter should work with another manufacturer's receiver. However, there are differences in the ways different radio aids perform. Any system with a transmitter and receiver that are not the same make and model should be fully tested in a hearing aid analyser before your child uses the system.

In the UK, the Government has set aside a number of different frequencies (channels) to be used only by radio aids. For details, see the chart on page 43.

Mute switches

Radio aids are designed to allow your child to concentrate on a single speaker (usually the teacher). However, in normal situations the child will also need to hear their own voice and the voices of nearby children. So a radio aid is usually set up so that the microphone on the child's hearing aid is working. Unfortunately, this means that the child may also hear unwanted background noise.

Manufacturers have developed ways of tackling this problem. One option is a 'mute switch' (currently available on the Connevans fmGenie, the Lexis and some Phonak Microlink/MLx/MLxS radio aids). When the mute switch on the receiver is on it will 'mute' (quieten) the hearing aid's microphone, effectively turning it off. The child can then concentrate on the teacher's voice. Then, when they want to hear what children nearby are saying, they can turn the mute switch off so their hearing aid's microphone comes on again. One advantage of this system is that it is easy to use. It allows a child to control their own listening conditions, leaving them to judge for themselves when they want to use it.

Some manufacturers of hearing aids produce 'shoes' that include a small switch that mutes the hearing aid microphone. These 'shoes' can be slightly less easy to use than a muting system built into a radio aid's receiver. This is because the switches are small and fiddly.

If your child has a digital hearing aid, the audiologist may be able to set up one of the programmes so that the hearing aid's microphone is switched off and they can just hear the radio aid.

The mute switch on a radio aid may not work properly with a few types of hearing aid. So it is important that your child's teacher or a technician checks the system carefully before giving it to your child.

Automatic muting

A more sophisticated alternative to a mute switch is 'automatic muting' (currently available on the Connevans fmGenie, Sennheiser 2013, Phonic Ear Solaris and as an option with the Connevans CRM220). The receiver checks the level of sound being picked up by the transmitter's microphone (usually the teacher's voice). When this is above a certain level, the hearing aid's microphone is automatically muted (quietened). When the teacher stops speaking, the hearing aid's microphone automatically comes back on.

Automatic muting can work well, but it should be used carefully. If the teacher is standing in a noisy environment, the noise may turn the automatic muting on, and switch the hearing aid's microphone off, when the teacher is not speaking. The teacher must also remember to turn their transmitter off when they are not speaking to the child wearing the receiver. Otherwise, your child may hear a conversation not intended for them, and they will also not be able to hear anything through their hearing aid's microphone.

Automatic muting is an option that can be switched off if it is not needed, usually by a hidden switch. Automatic muting is sometimes referred to as dynamic muting.

The automatic muting on a radio aid may not work properly with a few types of hearing aid. So it is important that your child's teacher or a technician checks the system carefully before giving it to your child.

Useful accessories

Auxiliary audio leads

Most radio aids' transmitters include an 'auxiliary input' socket. This allows the transmitter to be connected to a range of devices including a television, video recorder, computer, electronic keyboard or equipment in a school language laboratory. Manufacturers of radio aids produce a wide range of leads with commonly used connectors.

Some radio aids' receivers offer an 'audio output' socket. This can be used to connect the radio aid to a tape recorder. Lessons or lectures can then be recorded to allow your child to take notes at a later stage.

Control locks

Once a radio aid is set up for a young child to use, the controls should not be adjusted. Most radio aids have locks (for example, a small locking screw, a clip-on plastic cover or a hidden switch) on the volume control and other controls.

Working with radio aids at home and at school

Wearing a radio aid

There are several different ways of wearing a radio aid.



Chest harnesses

Young children often wear their radio aid's receiver in a harness on their chest. This can be the best way of keeping it safe and securely in place. Some harnesses allow teachers and parents to see the indicators or display on the front of the radio aid.

Some younger children wear a chest harness the 'wrong way round', so that the radio aid is on their back. This can help keep the radio aid clean, and help to stop your child fiddling with the controls.



Waist belts, belt clips and bum bags

Older children and adults generally wear their radio aid's receiver on the waist or in a pocket. Most receivers have a built-in belt clip. Others have specially designed waist belts or 'bum bags'. Bum bags can be very useful for children in mainstream schools who are responsible for their own radio aid during the school day. The bum bag can also keep the transmitter, batteries and accessories safely together in one place.

Generally, if a radio aid's receiver has a built-in environmental microphone (see page 10), it should be worn in a chest harness. If it is worn on the waist or in a bum bag, there is a risk that the microphone will be covered or that noise will be produced by clothes rubbing against it.



Wearing the transmitter

Your child's teacher or parent can also wear the transmitter in several different ways. Some transmitters have built-in microphones and so need to be worn around the neck on a neck harness or strap. When using a radio aid in this way, people often do not realise how close the transmitter should be to their mouth. The transmitter should be within 15 to 20cm of the mouth.

Many teachers prefer to clip the transmitter onto a belt and then wear a tie-clip or neck-worn microphone, or a head-worn microphone. Purpose-made waist belts are available for the transmitter.

Using a radio aid at home

A radio aid can be useful at home, but not in every situation. If you and your child are talking together in a quiet room, a radio aid should not be necessary. Here are a few examples of situations when your child might find their radio aid helpful.

- On a car, bus or train journey the listening conditions can be very difficult, with a lot of background noise. A radio aid can be helpful as it cuts out a lot of background noise.
- When you are in busy, noisy places (for example, at the shops or in the park) a radio aid can be helpful.
- A radio aid can help your child to fully take part in activities, at clubs and so on, even if the surroundings are noisy. For some activity or club leaders it may be the first time they are using a radio aid, so you must give them clear guidance on how it works and when it will be useful. Most radio aids are well-made and sturdy. However, they will not be suitable for most vigorous sports and activities.
- A radio aid can be connected directly to a TV, video, stereo system or computer (see page 20).

Even though it is clear that a radio aid can be helpful at home, some education services in the UK do not allow children to take their radio aid out of school. If you want to borrow the school radio aid you should discuss this with your child's hearing impaired service or teacher. If your local education service will not let you use the school radio aid at home, you should ask them to put their reasons in writing and then phone the NDCS Freephone helpline for further advice.

Using a radio aid at school (Information for teachers)

When used correctly, radio aids can be a great help to deaf children. If they are not used properly, they will no longer be useful. In the worst case, a badly used or poorly maintained radio aid could make the listening conditions more difficult for the child.

Good practice guidelines for teachers

There are a few basic guidelines to remember when you are a teacher using a radio aid transmitter at school.

- Remember to mute the transmitter microphone (where available) or switch the transmitter off when you are not speaking to the child either directly or as part of a group. For example, if the transmitter is on when you go off to talk to another child, the deaf child will pick up your conversation and may get confused. If the radio aid also uses automatic muting (see page 19), the deaf child will be cut off from hearing other noises through their hearing aid's microphone.
- Think about background noise. The transmitter can pick up sudden unexpected noise, so you should think about moving or turning the transmitter off for a brief time if it becomes very noisy. Remember to switch it on again.
- A child using a radio aid will still be able to hear you, even if you are not in the classroom. So remember to switch the transmitter off if you leave the room.

- Anything that knocks against the microphone will create noise, so don't wear loose jewellery and so on.
- If you use a television, video, computer or other audio equipment in the classroom, the radio aid's transmitter should be connected to it using an appropriate lead.
- There may be many children in a school using similar-looking radio aids, and they will all be set up differently to suit each child. So, each child's radio aid needs to be clearly identified.
- Radio aids must be checked each day to make sure that they are working properly (see page 24). You should have a system for recording all the faults on, and repairs carried out to, a child's individual radio aid. This record will help to highlight problems that happen often and indicate when a radio aid needs to be replaced.
- Batteries should be charged regularly. With older systems, this may involve recharging batteries every night. Even rechargeable batteries last for a limited period and should be replaced regularly.

A child using a radio aid will still be using other forms of communication (for example, sign language and lipreading). So, for example, you should do the following.

- Make sure you have the child's attention before starting to talk; otherwise they may miss the first part of your conversation or instructions.
- Speak clearly, naturally and at a normal pace. Remember that if you shout, this will distort your lip patterns. For deaf children using hearing aids, sudden loud noises can also be painful or startling. And speaking too slowly or over-exaggerating your mouth patterns will make it harder for a deaf child to understand you.
- Let the child know before you change the topic of your conversation, otherwise they may find the discussion confusing. It is useful to introduce the topic first before you go into detail. (For example, 'The Romans. Today we are going to focus on the life of the Romans.')
- Encourage other children to speak one at a time and to raise their hand before speaking so that a deaf child knows who is talking. Repeat questions or comments made by other children.
- Try to keep your hands free so that you can use natural gestures to support what you are saying.
- If you talk for a long period it can be difficult and tiring for a deaf child to lipread or watch a communication support worker. Keep your sentences short and remember to explain any new words or technical terms.
- Do not expect a deaf child to take notes on what you are saying as they will not be able to follow what you are saying and take notes at the same time. This also applies to using videos or slide shows – each time the child looks down to write, they will miss information.

For an introduction to these important communication issues, see our series of *Deaf Friendly Schools* publications or *Communicating with your deaf child* factsheet.

Taking care of radio aids

Used with care, radio aids should last for several years. Any problems are most likely to be caused by accessories (leads, microphones and so on) as these take most of the wear and tear. It is important to check the radio aid regularly. Parents or support assistants should also carry out a listening test frequently. Full scientific tests in a test box (a hearing aid analyser) should be carried out regularly by a fully-trained person, and whenever there is any change to your child's hearing aids.

The checks you can do on the radio aid will depend on the model. These guidelines are for general guidance only. For specific details about checking your child's radio aid, talk to their teacher of the deaf or educational audiologist. Most radio aids need to be listened to through a hearing aid connected to the radio aid's receiver.

Before you start, check that the hearing aid is working normally by following the guidelines in our book *Hearing Aids - A guide*.

Warning: never listen to any sounds that are at a volume you find uncomfortable.

Daily checks for radio aids used with hearing aids



- 1 Check that the transmitter and the receiver are both on the same frequency.
Radio aids from different manufacturers use either a number, letter or colour-coding system. It is important to check that the transmitter and receiver match.
- 2 If you are using replaceable batteries, check that they are fitted correctly. If possible, examine batteries for splits, cracks and damaged casings. If the batteries are damaged or show any signs of leaking, replace them.
- 3 Check the low-battery indicator, if there is one.
- 4 Fit the microphone and aerial to the transmitter, if these are part of the radio aid.
- 5 If your child is using direct audio input, connect one of your child's hearing aids to the radio aid's receiver, using the normal lead and shoe.
- 6 If your child uses a neckloop, wear the neckloop yourself during the test. Hook the hearing aid over your ear, and switch the hearing aid to the 'T' setting.



7 Connect a stethoscope to the hearing aid. A stethoscope allows a person to listen to a hearing aid to check how well it is working. The best stethoscope to use is one with an attenuator. An attenuator is used with a stethoscope to listen to powerful hearing aids. The attenuator will reduce the volume so that the sound is at a comfortable level for you to listen to. If you have an adjustable attenuator, begin listening with the volume at its lowest level and gradually increase it.



8 Switch on the transmitter, receiver and hearing aid. Listen through the stethoscope. Gently tug and pull any aerial and microphone lead on the transmitter. You should not hear any crackling noises (however, there will be some noise created by you handling the transmitter and its microphone). Experience will teach you to tell handling noise from faulty items. Gently squeeze the cases of the receiver and transmitter and listen for breaks in sound or unusual noises.



9 Turn on a radio or TV and place the transmitter microphone next to the loudspeaker. Try to find music rather than speech. Walk at least 4 to 5 metres away from the transmitter. This is so you do not confuse the sounds you hear through the radio aid with those that you hear through the hearing aid's microphone. Listen through the stethoscope and make sure you can hear at different parts around the room without a break in transmission or a drop in the sound quality. The sound from the transmitter should be clear and free from crackling. Gently flex and wiggle the connections on the receiver to listen for breaks in sounds or crackling. If it is a binaural fitting (to both ears) check both 'shoes' with both hearing aids and both arms of the direct audio input lead. Be aware of the normal noises caused by handling the hearing aid.



10 If you are using a radio aid with a neckloop, gently pull and wiggle the neckloop and connection leads and listen for breaks in sounds or crackling.

If there are any problems, try replacing the batteries, aerial or microphone (if you have any spares). If there are still problems, contact the person responsible for maintaining your child's radio aid.

Additional daily checks for radio aids with automatic muting (used with hearing aids)

At the moment, the Connevans fmGenie, Phonic Ear Solaris and Sennheiser 2013 are available with automatic muting. This means that muting can be switched on or off by a hidden switch. Before checking the automatic mute, make sure that the muting is switched on. The instruction manual shows how to check this.

- 1 Carry out the checks above (points 1 to 9 from page 24) to check that the radio aid's connections and the hearing aid all work well.
- 2 Connect the radio aid's receiver to the hearing aid and listen in through a stetoclip. Speak into the hearing aid's microphone. You should be able to hear your own voice through the stetoclip. Ask someone else to take the transmitter some distance from you (preferably the other side of a door) and ask them to speak into the transmitter microphone, just getting gradually louder, and then getting gradually quieter.
- 3 As the person gradually speaks more loudly, you should reach a point where you find that the level of your voice, as heard through the stetoclip, is muted (quietened). You should then be able to hear their voice clearly. As they reduce the level of their voice, the automatic muting system should turn off and allow you to hear your own voice again through the stetoclip.
- 4 If your child has two hearing aids, repeat this process for the other hearing aid and shoe.

The muting indicator (green light) on the front of the Sennheiser 2013 receiver does not prove that the muting is working. However, it shows that the sound picked up by the microphone is loud enough for automatic muting to come in. The indicator will light up even if the automatic muting is switched off.

Additional daily checks for radio aids with manual muting (used with hearing aids)

At the moment, only the Connevans fmGenie receiver, the Lexis receiver, the Phonak Microvox receiver, the MLx receiver, the MLxS receiver and some of the Phonak Microlink receivers have manual muting on the hearing aid's microphone. Manual muting is turned on with a switch or button on the receiver.

- 1 Carry out the checks above (points 1 to 9 on page 24) to check that the radio aid's connections and the hearing aid all work well.
- 2 Switch the muting on.
- 3 With the receiver connected to the hearing aid, listen through a stetoclip. Talk into the hearing aid's microphone. When you turn the muting on, the level of your voice should reduce.
- 4 If your child has two hearing aids, repeat this procedure for the other hearing aid and shoe.

Additional daily checks for radio aids receivers worn entirely behind-the-ear

Follow the procedure below if you have a Phonak Microlink, MLx or MLxS receiver or a Lexis receiver.

- 1 Look closely at the receiver for damage to all the connections, switches and the casing. If you have a Phonak Microlink receiver with a removable antenna, check that it is fitted securely and **turned fully clockwise**. If the antenna keeps turning and does not tighten, it is broken and the receiver needs to be repaired.
- 2 Check that you have the correct shoe. Some hearing aids must use a special shoe with behind-the-ear radio aid receivers. Often this is different from the shoe you would use with other radio aid receivers, although it may look similar. If you are not sure, check with the person who supplied the radio aid.
- 3 Before you fit the shoe, check that it is not cracked or damaged. Check that none of the wires, connections or metal pins inside the shoe are bent or broken. If the shoe appears damaged in any way, it will probably need replacing.
- 4 Fit the receiver to the hearing aid, turn the hearing aid on and listen in through a stetoclip.
- 5 Switch the transmitter on and listen to sounds from the transmitter. Gently squeeze the transmitter and flex the microphone (if you have one). Sounds should be consistent and crackle free (except for handling noises).
- 6 Put the transmitter near to a radio or TV, or ask someone to talk continually into the transmitter's microphone. Walk away from the transmitter and make sure that sound is not interrupted and that the quality of sound does not change over the distance you need to use the system over.
- 7 If there is a muting switch on the receiver, switch it to the 'mute' position (this is sometimes called the 'FM Only' position). Talk into the hearing aid's microphone. When you turn the muting on, the level of your voice should be reduced. (The 'mute' position may not work with some hearing aids.)

Regular checks by teachers and technicians

Your child's radio aid should be set up by an audiologist, educational audiologist, teacher of the deaf or qualified technician. They should regularly test the system to make sure it is working properly.

The method of setting up a radio aid is sometimes known as 'balancing'. This involves setting the radio aid's volume controls (and sometimes the tone controls) to an appropriate level. A hearing-aid analyser (or 'test box') is used to set up a radio aid.

The standard procedure for setting up a radio aid is known as the FM Advantage procedure. To find out more, speak to your audiologist or teacher of the deaf or contact our technology team by phoning our Freephone helpline.

Daily checks for radio aids used with cochlear implants

If your child has a cochlear implant, you cannot listen to the sounds they are hearing. However, you may be able to listen to the sounds being transmitted through the radio aid system before they are processed by the cochlear implant. To do this you will need to get some special earphones from your child's cochlear implant centre. Different cochlear implants work in different ways. The cochlear implant team will show you how to use the earphones with your child's cochlear implant. If you have these earphones, you can carry out the following checks each day:



- 1 Connect the earphones to the cochlear implant processor as your cochlear implant team has shown you. Check that the processor is working correctly as they have shown you.
- 2 Connect the radio aid and switch on the transmitter, receiver and processor in the order that the cochlear implant team have told you.
- 3 Check that the transmitter and the receiver are both on the same frequency. Radio aids from different manufacturers use either a number, letter or colour-coding system. It is important to check that the transmitter and receiver match.
- 4 If you are using replaceable batteries, check that they are fitted correctly. If possible, examine batteries for splits, cracks and damaged cases. If the batteries are damaged or show any signs of leaking, replace them.
- 5 Check the low-battery indicator, if there is one.
- 6 Fit the satellite microphone and aerial to the transmitter, if these are part of the radio aid.
- 7 Listen through the earphones. Gently tug and pull any aerial and microphone lead on the transmitter. You should not hear any crackling noises (however, there will be some noise created by you handling the transmitter and its microphone). Experience will teach you to tell handling noise from faulty items. Gently squeeze the cases of the receiver and transmitter and listen for breaks in sound or unusual noises.



- 8 Turn on a radio or TV and place the transmitter microphone next to the loudspeaker. Try to find music rather than speech. Walk at least 4 to 5 metres away from the transmitter. This is so you do not confuse the sounds you hear through the radio aid with those that you hear through the cochlear implant headset microphone. Listen through the earphones and make sure you can hear at a consistent level when in different parts around the room. The sound from the transmitter should be clear and free from crackling. Gently flex and wiggle the connections on the receiver to listen for breaks in sounds or crackling. Be aware of the normal noises caused by handling the cochlear implant.

B. Daily checks for radio aids with muting (used with a cochlear implant)

Radio aid muting systems will not work with some cochlear implants. You should check with your cochlear implant centre whether your child can use muting with their radio aid. The cochlear implant team will also be able to show you the best way to check that the muting system is working.



Classroom soundfield systems and acoustics

Classroom soundfield systems should not be confused with radio aids, although they are designed for similar purposes. Soundfield is an increasingly popular system designed to improve listening conditions for all children in the classroom.

How do soundfield systems work?

A soundfield system includes a microphone, worn by the teacher. This is linked to an amplifier by either an FM radio transmitter or an infra-red transmitter, to avoid the need for wires and allow the teacher to move around the room. Loudspeakers are fitted around the classroom, often on the walls or in the ceiling.

The soundfield system makes the teacher's voice louder. However, the aim is not to produce a very loud sound. Soundfield is **not** like a public address system. The aim is to produce a clear and consistent level of sound throughout the classroom. The teacher's voice is made just loud enough to be heard above unwanted background noises. A soundfield system that is set up correctly may not be noticeable. The teacher should not notice a big difference when they are speaking.

The soundfield amplifier may have controls that allow the output to be set to the correct levels for the room.

Who can it benefit?

Most children who wear a hearing aid or a cochlear implant will still need to use a personal radio aid. The group most likely to benefit from soundfield are children with mild deafness, who may otherwise be given no extra support at school. There are a large number of children who could fit into this category, including those who have temporary deafness (for example, from glue ear).

A soundfield system is also very helpful to the teacher. As well as helping them to avoid straining their voice, research has suggested that soundfield systems can improve discipline and concentration for all children.

Can radio aids be used in classrooms with soundfield systems?

Children who use radio aids can continue to use them very successfully in a classroom with a soundfield system. However, both devices must be set up correctly to work alongside each other. How to do this will depend on the particular products. Teachers also need to be clear about the correct way to use the technology.

Will soundfield systems solve all the problems of poor acoustics (sound quality) in a classroom?

If it is practical to improve the quality of sound in a classroom (for example, by lowering ceilings, changing wall coverings and adding soft flooring) this should be the first step. Fitting a soundfield system in a room with very poor acoustics could make listening conditions more difficult, rather than improving them.

Detailed standards and guidelines on sound quality in schools is given in the DfES publication, Building Bulletin 93: Acoustic Design of Schools. This is available on the website www.teachernet.gov.uk/acoustics, or from The Stationery Office by phoning 0870 600 5522.

For general information about listening conditions and acoustics in classrooms, contact our technology team by phoning our Freephone helpline.

Appendix 1

Technical specifications and suppliers

FM radio systems available in the UK

This section contains technical information summarising the features available on current radio aids. For more help with this information and a product update, phone our Freephone helpline.

Connevens CRM220



Transmitter (220T)

- lapel, head-worn or built-in microphone option
- conference microphone option
- 'battery good' and a 'battery low' indicator
- fixed frequency (from 35 frequencies used in the UK)
- alkaline or rechargeable PP3 battery (batteries removed for recharging)
- intelligent charger available
- auxiliary input socket – microphone switched off
- plug-in aerial
- 'microphone mute' switch available

Receiver (220R)

- optional microphone for environmental sounds when using neckloop
- conference microphone option
- auxiliary input socket
- control to adjust level of sound from transmitter
- dual reception frequency – one fixed on one of 35 frequencies used in the UK and the option to switch to a plug-in module on one of the remaining 34 frequencies
- AF frequency response modification switches – high lift and low cut (a form of tone control)
- control to adjust the auxiliary input and optional microphone level
- battery and charging as transmitter
- 'battery good' and 'battery low' light

Available from: **Connevens Ltd**

Connevens fmGenie



Transmitter

- lapel, head-worn, conference or built-in microphone option
- manual mute option on the microphone
- switch between 35 frequencies used in the UK
- choice of 'automatic gain control' recovery times (slow/fast)
- 500Hz test-tone facility to help with checking reception in the radio aid system
- switch for using the transmitter over a long distance or a standard distance
- sound indicator and display of signal strength
- 'low battery' indicator and display of battery level
- display of a microphone fault or aerial fault
- auxiliary input socket with choice of having the microphone switched off or on
- channel number display
- intelligent battery charging using plug-in charger, or you can remove the batteries to recharge, or use alkaline batteries
- automatic power off

Available from: **Connevens Ltd**

Receiver

- battery charging as transmitter
- switch between 35 frequencies used in the UK
- high or low outputs available
- optional environmental microphone for environmental sounds if using neckloop
- sound indicator and display of FM signal strength
- display of battery level and 'battery low' indicator
- no FM indicator
- manual mute option
- automatic mute available
- tone adjustable and on/off switch on the controls
- auxiliary output socket
- channel number display
- automatic power off
- option to automatically tune to transmitter frequency
- lockable volume control
- concealed controls

Lexis



Transmitter

- built-in microphone – hand held, neck worn or table stand
- head-worn microphone available as optional extra
- LCD display with channel and battery level indicator
- charging from external charger
- uses rechargeable or disposable alkaline AAA batteries
- up to 14 programmable frequencies
- switch to choose between 3 microphones – omnidirectional, 'focus' and 'superfocus'
- auxiliary audio input
- plug-in aerial

Available from:

PC Werth Ltd

Oticon Ltd

Starkey Ltd



Receiver

- behind-the-ear receiver
- compatible with a wide range of hearing aids using specific direct audio input shoes
- three-position switch – 'off', 'FM with hearing aid microphone muted' and 'FM with hearing aid microphone switched on'
- one fixed frequency (from a choice of 14) if used in the UK
- adjustable FM gain control +/- 7dB

Phonak Campus S



Transmitter

Multifunctional lapel microphone (omnidirectional/directional) or head-worn microphone

- LCD display with channel and battery-level indicator
- up to 40 programmable frequencies
- can be programmed to pre-selected channel
- auto-tune facility for MLxS receivers
- charging from a plug in charger
- auxiliary input socket

Available from:

Phonak UK Ltd
Connevans Ltd

Phonak/Widex Handymic



Transmitter

- built-in microphone – hand held, neck worn or table stand
- 'battery low' and 'on charge' light
- charging from external charger
- Choose from 5 UK frequencies through plug-in units
- switch to choose between 3 microphones – omnidirectional, directional, superdirectional
- auxiliary audio input (microphone switched off)
- plug-in aerial

Available from:

Phonak UK Ltd
PC Werth Ltd
Connevans Ltd

Phonak SmartLink SX



Transmitter

- built-in microphone (omnidirectional, directional and superdirectional)
- aerial built into neck cord
- LCD display with channel and battery-level indicator
- up to 40 programmable frequencies
- auto-tune facility for MLxS receivers
- remote control for some Phonak hearing aids
- plug in charger
- auxiliary input socket
- Bluetooth enabled for compatible mobile phones

Available from:

Phonak UK Ltd
Connevans Ltd

Phonak TelCom



Transmitter

The TelCom is a fixed transmitter that is designed to transmit sound from the television and telephone direct to the wearer's FM receivers. When the telephone handset is picked up, TelCom automatically mutes the TV audio signal so that the caller can be heard. When the handset is replaced, the sound from the TV is restored to its original level.

Wallpilot



WallPilot is an optional extra that is designed to automatically synchronize MLxS receivers to the frequency used in the classroom as the pupil enters the room. It has an adjustable operating range of up to 2 metres.

Both available from:

Phonak UK Ltd
Connevans Ltd

Phonak/Widex Microlink MLx



Receiver

Use Handymic transmitter, Campus S transmitter, Smartlink SX transmitters or alternative compatible transmitter.

- behind-the-ear receiver
- compatible with a wide range of hearing aids using specific direct audio input shoes
- hearing aid may need to be altered
- three-position switch – ‘off,’ ‘FM with hearing aid microphone muted’ and ‘FM with hearing aid microphone switched on’
- one frequency fixed from five used in the UK
- Microlink BAHA version available for the Compact BAHA
- ML8 version available for Phonak Claro behind-the-ear hearing aids

Available from:

Phonak UK Ltd
PC Werth Ltd
Connevans Ltd

Phonak MLxS



Receiver

Use Campus S or SmartLink SX transmitters. Other compatible transmitters may be used but will not be able to change the frequency of the receiver.

- compatible with most behind-the-ear hearing aids and the Cochlear Esprit 3G processor
- multi-frequency - can be tuned in to any UK frequency using the appropriate transmitter
- sleep mode
- Microlink BAHA version available for the Compact BAHA
- ML8S version available for Phonak Claro and Perseo behind-the-ear hearing aids

Available from:

Phonak UK Ltd
Connevans Ltd

Phonak CI S



Receiver

Use with the Campus S or SmartLink SX transmitter. You can use other compatible transmitters but they will not be able to change the frequency of the receiver.

- compatible with most cochlear implant processors
- can be tuned into any UK frequency using the appropriate transmitter
- sleep mode

Available from:

Phonak UK Ltd

Phonak EduLink



EduLink is a small, behind-the-ear, multi frequency FM receiver. It may benefit children, who do not wear hearing aids, with certain conditions such as auditory processing disorder, attention deficit and hyperactivity disorder, unilateral sensori-neural hearing loss and varying conductive hearing loss. It can be used with the Campus S or SmartLink SX transmitters. Other compatible transmitters may be used but will not be able to change the frequency of the receiver

Available from:

Phonak UK Ltd

Phonic Ear Solaris



Transmitter (571T)

- lapel directional, lapel omnidirectional, head-worn, conference, or built-in microphone available
- switch between 34 frequencies used in the UK
- auxiliary input socket
- 'low battery' light and 'no FM' light
- 3 battery charge options:
 - in dual-pocket charger
 - plug-in charger
 - remove batteries for charge
- will run on two alkaline AA batteries

Available from:

PC Werth Ltd

Receiver 572R version

- 'low battery' light and 'no FM' light
- switch between 34 frequencies used in the UK
- choose from high or low output with a hidden switch
- FM Plus (automatic muting of the hearing aid's microphone, hidden on/off switch)
- auxiliary socket with a hidden switch to choose between different sound sources
- TMX digital neckloop facility – hidden on/off switch
- FM level control
- volume controls are lockable
- batteries and charging as transmitter 571T

575R version

All the features of 572R plus

- built-in environmental microphone for environmental sounds if using conventional neckloop (not TMX)

Phonic Ear Solaris Binaural

With essentially the same design and features as the Solaris (above), the Solaris Binaural receiver also incorporates two powerful hearing aids. The Solaris Binaural must be provided and fitted by an audiologist.

Phonic Ear Portable Soundfield



Transmitter

- single or multi-frequency options available
- auxiliary input socket
- 'low-battery' light and 'no FM' light (Solaris PE571T transmitter only)
- plug-in charger or remove batteries to recharge (both transmitters), or use a drop-in charger (Solaris PE571T transmitter only)
- head-worn microphone, lapel microphone

Receiver

- single or multi-frequency options available
- Plug in charger or remove batteries to recharge (both transmitters), or use a drop-in charger (Solaris PE572R or PE 575R receivers only)
- volume control

Available from:

PC Werth Ltd

Sennheiser 2013



Transmitter

- lapel or built-in microphone option
- conference microphone option
- 'battery low' light
- switch between 16 frequencies used in the UK (15 on some versions)
- dual-pocket charger – for sealed Sennheiser battery packs
- option to use two AA alkaline or rechargeable batteries in opening battery pack
- auxiliary socket to accept input from different sources, with choice of microphone switched on or off
- hidden microphone sensitivity control

Receiver

- built-in microphone for environmental sound when using neckloop (hidden control to adjust level and hidden switch to turn off environmental microphone)
- 'battery low' light and 'no FM' light
- switch between 16 frequencies used in the UK (15 on some versions)
- separate high- and low-output sockets
- automatic mute available
- hidden switch to turn off automatic muting
- green light to show when automatic muting will come in if switched on
- hidden control to adjust level of sound from transmitter
- hidden control to change level mute comes in at
- battery and charging as transmitter

Available from:

BioAcoustics Ltd

Addresses of suppliers:

BioAcoustics Ltd

26 Guildford Street
Luton
Bedfordshire
LU1 2NR

Phone: 01582 431000
Fax: 01582 488227
Text: 01582 481411
Email: info@bioacoustics.com
Website: www.bioacoustics.com

Connevens Ltd

54 Albert Road North
Reigate
Surrey
RH2 9YR

Phone: 01737 247571
Text: 01737 243134
Fax: 01737 223475
Email: mail@connevens.com
Website: www.connevens.com

Oticon Ltd

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33-45 Croydon Road
Caterham
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CR3 6PG

Phone: 01883 331720
Fax: 01883 331729
Email: info@oticon.co.uk
Website: www.oticon.co.uk

PC Werth Ltd

Audiology House
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Phone: 020 8772 2778
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Email: pcwerth@pcwerth.co.uk
Website: www.pcwerth.co.uk

Phonak UK Ltd

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Website: www.phonak.co.uk

Starkey Laboratories Limited

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Email: sales@starkey.co.uk
Website: www.starkey.co.uk

Radio aid images kindly supported by:

BioAcoustics Ltd
Connevens Ltd
Oticon Ltd
PC Werth Ltd
Phonak UK Ltd

Appendix 2

Frequency comparison table (for school use)

Frequency comparison table reprinted courtesy of the Ewing Foundation.

| MHz | Connevens fmGenie & CRM 220 | | Phonic Ear Solaris | | Oticon and Phonic Ear | Phonak | | | Sennheiser Mikroport 2013 | |
|---------|-----------------------------------|--------------------------|---------------------------|--------------------------|--------------------------------|-----------|-----|-------------------|------------------------------|--------------------------|
| | Before January 2004 | After January 2004 | Before January 2004 | After January 2004 | Lexis | Microvox | MLx | MLxS ¹ | Before January 2004 | After January 2004 |
| 173.350 | 00 N | 38 | 13 | 13 | | 01 GREEN | | X | 0 | 0 |
| 173.400 | 01 A | 39 | 15 | 15 | 15 | 02 AQUA | H02 | X | 1 | 1 |
| 173.450 | | 40 | | 17 | | | | X | | 2 |
| 173.465 | 02 B | | 19 | 19 | | 03 BLUE | | X | 2 | |
| 173.500 | | 41 | | 21 | | | | X | | 3 |
| 173.545 | 03 C | | 23 | 23 | 23 | 04 RED | | X | 3 | |
| 173.550 | | 42 | | 24 | | | | X | | 4 |
| 173.600 | | 43 | | 25 | 25 | | | X | | 8 |
| 173.640 | 04 D | | 26 | 26 | 26 | 05 ORANGE | | X | 4 | |
| 173.650 | | 44 | | 27 | | | | X | | 5 |
| 173.695 | 05 P | | 28 | 28 | | 11 GREEN | | X | 5 | |
| 173.700 | | 45 | | 29 | | | | X | | 6 |
| 173.750 | | 46 | | 30 | | | | X | | 7 |
| 173.775 | 06 Q& | | | | | 12 AQUA | | X | 6 | |
| 173.800 | | 47 | | 32 | 32 | | | X | | 9 |
| 173.825 | 07 R | | 33 | 33 | | 13 BLUE | | X | 7 | |
| 173.850 | | 48 | | 34 | | | | X | | |
| 173.900 | | 49 | | 35 | | | | X | | |
| 173.950 | 08 S | 50 | 36 | 36 | 36 | 14 RED | | X | 8 | E |
| 174.000 | 09 | 51 | | 37 | | | | X | | |
| 174.050 | | 52 | | 38 | | | | X | | |
| 174.070 | 10 T | | 39 | 39 | | 15 ORANGE | | X | 9 | |
| 174.100 | | 53 | | 40 | | | | X | | A |
| 174.120 | 11 U | | 41 | 41 | 41 | 16 YELLOW | H16 | X | A | |
| 174.150 | | 54 | | 42 | 42 | | | X | | |
| 174.185 | 12 V | | 43 | 43 | | 17 WHITE | | X | B | |

1] Phonak microvox MLxS can be programmed to any frequency

See page 18 for important information about using transmitters and receivers from different manufacturers.

| MHz | Connevens fmGenie & CRM 220 | | Phonic Ear Solaris | | Oticon and Phonic Ear | Phonak | | | Sennheiser Mikroport 2013 | |
|---------|-----------------------------------|--------------------------|---------------------------|--------------------------|--------------------------------|-----------|-----|-------------------|------------------------------|--------------------------|
| | Before January 2004 | After January 2004 | Before January 2004 | After January 2004 | Lexis | Microvox | MLx | MLxS ¹ | Before January 2004 | After January 2004 |
| 174.200 | | 55 | | 44 | | | | X | | |
| 174.250 | | 56 | | 45 | | | | X | | |
| 174.270 | 13 W | | 46 | 46 | | 18 GREY | | X | C | |
| 174.300 | | 57 | | 47 | | | | X | | F |
| 174.350 | | 58 | | 48 | 48 | | | X | | |
| 174.360 | 14 X | | 49 | 49 | | 19 BLACK | | X | D | |
| 174.400 | | 59 | | 50 | | | | X | | |
| 174.415 | 15 Z | | 51 | 51 | 51 | 20 VIOLET | H20 | X | E | |
| 174.450 | | 60 | | 52 | | | | X | | B |
| 174.500 | 16 | 61 | | 53 | | | | X | | |
| 174.550 | | 62 | | 54 | | | | X | | |
| 174.600 | 17 E | 63 | 55 | 55 | 55 | 06 YELLOW | H06 | X | F | |
| 174.650 | | 64 | | 57 | | | | X | | |
| 174.675 | 18 F | | 58 | 58 | | 07 WHITE | | X | | |
| 174.700 | | 65 | | 59 | | | | X | | |
| 174.750 | | 66 | | 60 | | | | X | | |
| 174.770 | 19 G | | 61 | 61 | 61 | 08 GREY | H08 | X | | |
| 174.800 | | 67 | | 62 | 62 | | | X | | |
| 174.850 | | 68 | | 63 | | | | X | | |
| 174.885 | 20 H | | 64 | 64 | | 09 BLACK | | X | | |
| 174.900 | | 69 | | 65 | | | | X | | |
| 174.950 | | 70 | | 66 | | | | X | | C |
| 175.000 | | 71 | | 67 | 67 | | | X | | |
| 175.020 | 21 J | | 68 | 68 | | 10 VIOLET | | X | | |
| 175.050 | | 72 | | | | | | X | | D |

1] Phonak microvox MLxS can be programmed to any frequency

Appendix 3

Technical terms

The following list explains some of the technical terms professionals may use when talking about radio aids. Some terms may have several different meanings, but they are defined here in the context of radio aids. Most of the terms are explained more fully in the main text.

| | |
|-----------------------------------|--|
| Amplify | Make sounds louder. |
| Attenuator | 1 A device which is used with a stetoclip to allow a hearing person to listen to powerful hearing aids at a comfortable level. 2 Tiny control in some 'shoes' which may be adjusted when a radio aid is fitted. |
| Audiologist | A person qualified in assessing hearing loss and fitting hearing aids. |
| Audio output socket | A socket that allows a tape recorder to be connected to a radio aid, so that lessons and lectures can be recorded for later use. |
| Auxiliary input socket | A socket that allows a tape recorder, television or other source to be connected directly to a radio aid. |
| Balancing | The process of setting up a radio aid to work correctly with a hearing aid. |
| Binaural | Affecting both ears. |
| Body-worn hearing aid | A hearing aid where the microphone and volume control are part of a small box worn on the body, often using a chest harness. This is connected by a lead to the earphones. |
| Bone anchored hearing aid | A type of hearing aid which involves a surgical procedure to allow a vibrating device to be attached to the skull. The device transmits sound to the inner ear. |
| Bone conduction aid | A type of hearing aid which uses a vibrating device held against the skull to transmit sound to the inner ear. |
| Boom microphone | A hands-free microphone designed to be worn on the head so it stays close to the mouth. It is the same as a head-worn microphone |
| Behind-the-ear | A type of hearing aid worn behind-the-ear. |
| Charger | Device used to charge rechargeable batteries. |
| Cochlear implant | Device that is surgically implanted into the inner ear to help with hearing. |
| Conference microphone | A microphone used in a group situation to pick up the voices of a number of speakers. Often placed at the centre of a table. |
| Coupling | The process of connecting a radio aid to a hearing aid with or without wires. |
| Direct audio input | A system available on some hearing aids that allows an external sound source (for example, a radio aid) to be connected electronically. |
| Directional microphone | A microphone that gives priority to sounds coming from one direction only. |
| Disabled Student Allowance | An allowance for disabled students. It does not depend on a household's income. |
| Education and Library Board (ELB) | A local government department in Northern Ireland that is responsible for running the educational services in the area. |
| Environmental sounds | Sounds near to the listening child, including their own voice. |
| FM | The type of radio communication technology used in radio aids. The same technology is used in radios. |
| Frequency | The channel a radio aid is on. |
| Frequency response | One standard of measuring the performance of a hearing aid or radio aid. |
| Head-worn microphone | A hands-free microphone designed to be worn on the head so it stays close to the mouth. |
| Hearing aid | An electronic device designed to help a deaf child or adult to hear sounds. |
| Hearing-aid analyser | Scientific test equipment to evaluate the performance of a hearing aid. Can also be used to carry out tests on radio aids. |
| Hearing impaired service | An education department within a local authority that is responsible for education services for deaf children. Some local authorities may also call them sensory support service. |
| Inductive coupling | A way of transferring an electronic signal from a radio aid to a hearing aid without wires, through an electromagnetic field. |

| | |
|--|---|
| In-situ charging | Recharging batteries without removing them from the radio aid. |
| In-the-ear hearing aid | A type of hearing aid worn entirely inside the ear. |
| Lavalier microphone | A microphone worn around the neck on a cord. |
| Local education authority | Local government departments in England and Wales that is responsible for running the educational services in the area. |
| Loop | A wire loop that produces an electromagnetic field. |
| MHz | Megahertz. A unit that frequency is measured in. |
| Microphone | A device that converts sound into an electronic signal. Many different types of microphone are available. |
| Monaural | One ear only. |
| Mute | Quieten. |
| Neckloop | A wire worn around the neck, designed to connect a radio aid to a hearing aid. |
| NiCd | Nickel cadmium – a type of rechargeable battery. |
| NiMH | Nickel metal hydride – a type of rechargeable battery. |
| Noise | Unwanted sounds. |
| Omnidirectional microphone | A microphone that picks up sounds from all directions. |
| Digital neckloop | A digital neckloop combines many of the advantages of a standard neckloop and direct audio input (DAI). |
| Radio aid | FM transmitter and receiver, designed to improve listening conditions for a deaf child or adult. Generally used together with hearing aids. |
| Radio hearing aid | Combines a radio receiver and left and right hearing aids in one body-worn unit. Can be used with or without a radio transmitter. |
| Receiver | Part of a radio aid worn by the deaf child or adult. |
| Record of needs | A document that sets out a child's needs and all the extra help they should receive. (Scotland only) |
| Reverberation | Echo – sounds echoing around a room that can make listening conditions more difficult for deaf children. |
| Sensory support service | An education department within a local authority that is responsible for education services for deaf children. Some local authorities may also call them hearing impaired service. |
| Shoe | Allows a direct audio input (DAI) lead to be connected to a hearing aid. There are many types and they are usually specific to one model of hearing aid. Some 'shoes' include a built-in attenuator that reduces the level of the signal received by the hearing aid. |
| Signal-to-noise ratio | A measurement of the level of a desired sound in relation to unwanted sounds. |
| Silhouette inductor | An alternative to a neckloop that connects a radio aid, without wires, to a behind-the-ear hearing aid. It is worn between the head and the hearing aid. |
| Soundfield FM system | Designed to improve the sound quality for hearing or deaf children in a classroom. Not to be confused with a radio aid. |
| Special educational needs co-ordinator (SENCO) | A member of staff at a school who has responsibility for co-ordinating the way special educational needs are met within that school. |
| Statement of special educational needs | A document that sets out a child's needs and all the extra help they should receive (England, Wales and Northern Ireland). |
| Stetoclip | A device that allows a hearing person to listen to a hearing aid to check how well it is working. |
| Teacher of the deaf | A teacher who holds a specialist qualification in teaching deaf children. |
| Telecoil | A feature available on most hearing aids that allows a child to use a neckloop. |
| Telepin | A device used to receive signals from a PCM neckloop. |
| Test box | Scientific test equipment to evaluate the performance of a hearing aid. Can also be used to carry out tests on radio aids. Test box is same as a Hearing-aid analyser. |
| Tie-clip microphone | A microphone designed to be clipped to the speaker's clothing. |
| Transition plan | A document to make sure that a child who has had a statement of special needs or a record of needs while at school, continues to get the support they need when they leave school to go to work or to further or higher education. |
| Transmitter | Part of a radio aid worn by the speaker. |
| TMX | A brand name used by Phonic Ear to describe their digital neckloop system. |
| Unilateral deafness | Deafness in one ear only, or deafness that is significantly greater in one ear than the other. |
| Vibrating transducer | A device that changes electrical signals into vibrations. |
| WDI | A brand name used by Connevens Ltd to describe their digital neckloop system. |

The National Deaf Children's Society



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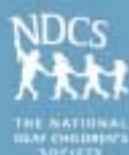
- radio aids
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● NDCS Freephone helpline
● **0808 800 8880**
● (voice and text)

● open Mon to Fri 10am to 5pm
● email technology@ndcs.org.uk
● fax 020 7251 5020

* The NDCS uses the term 'deaf' to cover all types of hearing loss, including temporary hearing loss such as glue ear.

www.ndcs.org.uk



NDCS is an organisation whose members include parents, families, carers and professionals working with deaf children. We support parents in helping their child to develop their skills and abilities.

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- A Freephone helpline 0808 800 8880 (voice and text) and a range of publications for parents and professionals that can be downloaded from our website at www.ndcs.org.uk
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- Support with benefits claims and Disability Appeals Tribunals
- Education advice and support at Special Educational Needs Tribunals and Appeals
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- A network of regional staff and local contacts
- Personal development and training for young deaf and hearing people
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- *TALK*, a magazine for members produced six times a year

The National Deaf Children's Society

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ISBN: 0 904691 56x

Registered Charity No 1016532

February 2005

